

CLAIMS

1. An implant useful for treating rotational malfunction of the spinal column wherein said device is adapted to apply pure rotational progressive forces, comprising;
 - a. a linear plate having a longitudinal axis adapted to exceed from an apex of the upper scoliotic curve to an apex of the lower scoliotic curve, having predetermined axial dynamic de-rotational properties, having a spring-like means to torque in axial plate and permitting free movements in coronal, longitudinal and/or sagital directions;
 - b. at least two anchors interconnecting said plate with the spinal column, each of said anchors is having a proximal and distal portions;
said proximal portion is having means to be reversibly affixed on any position along the longitudinal axis of said plate;
said distal portion is having a connecting means to entrap the spinal column in at least two locations; and
 - c. clasp means, adapted to effectively clasp the spinous process portion of the spinal column in the manner the spinal column is to be rotate in a predetermined measure at the time the anchors are entrapping the spinal column and the linear plate is torqued.
2. The implant according to claim 1, wherein each of the anchors comprises;
 - a. anchor parts, comprising;
 - i. a grip in the distal portion of the device adapted to be entrapped into the spinal column;
 - ii. base part in the proximal portion of the device; and
 - b. a triangular shaped base, adapted to interconnect said base part of the anchor with the linear spring plate and permits holding the linear plate in twisted position.
3. The implant according to claim 2, wherein the triangular shaped base is interconnecting the base part of the anchor with the linear plate by a means of an immobilizer.

4. The implant according to claim 2, wherein the triangular shaped block base comprising V-shaped or U-shaped clasping means, adapted to clasp the spinous process portion of the spinal column effectively.
5. The implant according to claim 2, wherein the triangular shaped base comprising a flat distal surface, comprising;
 - a. two triangular or curved protruded grips facing each other; said grips comprising means to immobilize the immobilizer; and
 - b. a space between one grip to the other, wherein the width of said space is about 1mm more than the width of the linear plate so a predetermined coronal, longitudinal and/or sagittal movement of the plate is provided.
6. The implant according to claim 1, wherein the anchors are selected from hook-like members; screw-like members, pins, hooks, clasps, fasteners, clips, nails and any combination thereof.
7. The implant according to claim 1, adapted for the correction of Idiopathic Scoliosis.
8. The implant according to claim 7, adapted to treat of Idiopathic Scoliosis either exceeded from the thoracic to the lumbar or from an apex of the upper scoliotic curve to an apex of the lower scoliotic curve.
9. The implant according to claim 7, adapted to treat of Idiopathic Scoliosis comprising more than two apexes of the scoliotic curve the implant comprising
 - a. set of anchors having the same number as the number of the spinal apexes; and
 - b. linear plates in number of one less than the number of (a).
10. The implant according to claim 1, wherein the shape of the linear plate is selected from a polygon form, a rod-like form, a sheet-like form, a helical form, a spring, a frame comprising parallel enforcing structures, a bundle of fibers, a screw-like

member, a network of warp and weft enforcement, a porous matrix or any combination thereof.

11. The implant according to claim 1, wherein the linear plate is made a material selected from 304 Stainless Steel, composite materials, shape memory materials and any combination thereof.
12. The implant according to claim 1, wherein the moment force is tailor made by the physician and ranges from about 5 to about 150 lbs per cm.
13. The implant as defined in claim 1 or in any of its preceding claims, wherein at least portion of the anchors are as described in figures 3 or 4.
14. A method for treating rotational malfunction of the spinal by a means of the implant as defined in claim 1 or in any of the preceding claims, said method comprising:
 - a. exposing the spinal column over the apex of the proximal (upper) scoliotic curve;
 - b. placing the anchors to the higher scoliotic curve;
 - c. placing the anchors to the lower scoliotic curve;
 - d. making the subcutaneous tunnel between the two operating wounds by blunt dissection under superficial fascia;
 - e. placing the spring-plate into the subcutaneous tunnel; and
 - f. twisting the distal (lower) end of the spring-plate along its longitudinal axis in the opposite direction to the proximal (upper) end of the spring-plate;
15. The method according to claim 14, wherein the exposing the spinal column over the apex of the proximal scoliotic curve comprising:
 - a. making straight midline skin incision centered over the apex of the proximal scoliotic curve;
 - b. deeping the incision to the level of the spinous processes; so the base part of the apical vertebra is extraperiosteally exposed from each side of it;
 - c. extending the extraperiosteal dissection sideways from the spinous process; and
 - d. going with dissection and retraction until the middle part of the transverse

process on each side of the apical vertebra is exposed.

16. The method according to claim 14, wherein the placing of the spring-plate into the subcutaneous tunnel comprising;
 - a. inserting the proximal end of the spring-plate into the slot under the connecting plate of the anchors assembly; and
 - b. securing the spring-plate to the anchors assembly by tightening of the two small screws.
17. The method according to claim 14, wherein the placing the self-retaining retractors comprising the following stages:
 - a. placing the self-retaining retractors adjacent to the spinal column to hold the entire incision open and exposed;
 - b. placing the hook part of the anchor by sliding the tip of it under the base of the transverse process;
 - c. performing the same procedure on the other side of the vertebra;
 - d. fixating the triangular slope-block part to the flat surface of the anchor located on the convex side of the scoliotic curve;
 - e. pushing the anchors towards the middle line and to each other until they contact above the spinous process of the apical vertebra and intact supraspinous ligament in the manner that no ligament tissue is crushed between their docking parts; and
 - f. immobilizing both anchors by placing the connecting plate on the upper flat surfaces of the anchors and loosely fixating the connecting plate.
18. The method according to claims 14 and 15, useful for placing the anchors to the lower scoliotic curve, comprising the step of performing a separate incision on the level of the apical vertebra of the distal (lower) scoliotic curve wherein the connecting plate is affixed only to one anchor located on the concave side of the scoliotic curve so the triangular slope-block is located on the opposite side to the triangular slope-block of the upper anchor assembly.

19. The method according to claims 14, wherein the twisting the distal end of the spring-plate along its longitudinal axis in the opposite direction to the proximal (upper) end of the spring-plate comprising;
 - a. adjusting the spring-plate to the flat surfaces of the distal anchor assembly; and
 - b. fixating the spring plate under the connecting plate using two small screws on each end of the connecting plate.
20. The method according to claim 14, wherein the final step is suturing the operative wounds in usual fashion.
21. A method as defined in claim 14 or in any of its preceding claims, wherein the rotational malfunction of the spinal column is Idiopathic Scoliosis.